CLAIMS

What is claimed is:

1. An ejector cycle device of vapor compression type for moving heat from a low-temperature side to a high-temperature side, the ejector cycle device comprising:

a compressor for sucking refrigeration oil along with a carbon dioxide refrigerant, and compressing the refrigerant;

a high-pressure side heat exchanger for radiating heat of a high-pressure refrigerant discharged from the compressor;

a low-pressure side heat exchanger for evaporating a low-pressure refrigerant;

an ejector having a nozzle for decompressing and expanding the high-pressure refrigerant isentropically, the ejector sucking a gas-phase refrigerant evaporated in the low-pressure side heat exchanger by means of a high-speed refrigerant flow injected from said nozzle and converting expansion energy into pressure energy to increase a suction pressure of the compressor; and

a gas-liquid separator for separating a refrigerant flowing out of the ejector into the gas-phase refrigerant and a liquid-phase refrigerant, wherein the gas-liquid separator includes:

a gas-phase refrigerant port connected to a suction side of the compressor and a liquid-phase refrigerant port connected to the low-pressure side heat exchanger;

a gas-phase refrigerant outlet opening at a gas-phase component area in the gas-liquid separator, the gas-phase refrigerant outlet being in communication with the suction side of said compressor;

a liquid-phase refrigerant outlet opening at a liquid-phase component area in the gas-liquid separator, the liquid-phase refrigerant outlet being in communication with a refrigerant-inlet side of the low-pressure side heat exchanger; and

an oil outlet opening at a liquid-phase component area of the refrigeration oil in the gas-liquid separator, the oil outlet being in communication with the suction side of the compressor,

wherein a refrigeration oil compatibility relative to the refrigerant on the low-pressure side is less than a refrigeration oil compatibility relative to the refrigerant on the high-pressure side.

2. The ejector cycle device according to claim 1, wherein the refrigeration oil is polyalkylglycol based oil.

3. The ejector cycle device according to claim 1, wherein the refrigeration oil is alkylbenzene based oil.

4. The ejector cycle device according to claim 1, wherein the refrigeration oil is mineral oil.

5. The ejector cycle device according to claim 4, wherein a pressure on the side of the high-pressure side heat exchanger reaches or exceeds a critical pressure of the refrigerant.

6. The ejector cycle device according to claim 3, wherein a pressure on the side of the high-pressure side heat exchanger

reaches or exceeds a critical pressure of the refrigerant.

7. The ejector cycle device according to claim 2, wherein a pressure on the side of the high-pressure side heat exchanger reaches or exceeds a critical pressure of the refrigerant.

8. The ejector cycle device according to claim 1, wherein a pressure on the side of the high-pressure side heat exchanger reaches or exceeds a critical pressure of the refrigerant.

9. An ejector cycle device of vapor compression type for moving heat from a low-temperature side to a high-temperature side, the ejector cycle device comprising:

a compressor for sucking refrigeration oil along with a refrigerant and compressing the refrigerant;

a high-pressure side heat exchanger for radiating heat of a high-pressure refrigerant discharged from the compressor;

a low-pressure side heat exchanger for evaporating a low-pressure refrigerant;

an ejector having a nozzle for decompressing and expanding the high-pressure refrigerant isentropically, the ejector sucking a gas-phase refrigerant evaporated in said low-pressure side heat exchanger by means of a high-speed refrigerant flow injected from said nozzle and converting expansion energy into pressure energy to increase a suction pressure of said compressor; and

a gas-liquid separator for separating a refrigerant flowing out of said ejector into the gas-phase refrigerant and a liquid-phase

refrigerant, the gas-liquid separator having a gas-phase refrigerant port connected to a suction side of said compressor and a liquid-phase refrigerant port connected to said low-pressure side heat exchanger,

wherein a refrigeration oil compatibility relative to the refrigerant on the low-pressure side is less than a refrigeration oil compatibility relative to the refrigerant on the high-pressure side.

10. A gas-liquid separator for an ejector cycle device of vapor compression type for moving heat from a low-temperature side to a high-temperature side, wherein the gas-liquid separator separates incoming refrigerant into a gas-phase refrigerant and a liquid-phase refrigerant, the gas-liquid separator comprising:

a refrigerant inlet disposed above a gas-liquid separator fluid level, wherein the refrigerant inlet is in fluid communication with a pressure increasing portion of a nozzle to thereby deliver statically pressurized incoming refrigerant;

a liquid-phase refrigerant port disposed below the gas-liquid separator fluid level, wherein the liquid-phase refrigerant port is in fluid communication with a low-pressure side heat exchanger to thereby deliver the liquid-phase refrigerant separated from the statically pressurized incoming refrigerant to a low-pressure side heat exchanger; and

a gas-phase refrigerant outlet disposed within a gas-phase component area, wherein the gas-phase refrigerant outlet includes an oil outlet disposed within a liquid-phase component area and below the liquid-phase refrigerant port for separating refrigerant

oil from the liquid-phase refrigerant, wherein the gas-phase refrigerant outlet is in fluid communication with a compressor to thereby deliver gas-phase refrigerant and refrigerant oil separated from the statically pressurized incoming refrigerant to a high-pressure side heat exchanger.

11. The gas-liquid separator according to claim 10, wherein a refrigeration oil compatibility relative to the refrigerant on a low-pressure side is less than a refrigeration oil compatibility relative to the refrigerant on a high-pressure side.

12. The gas-liquid separator according to claim 10, wherein a gas refrigerant pipe including gas-phase refrigerant outlet is generally U-shaped and the oil outlet is disposed within a bend portion of the gas refrigerant pipe.

13. The gas-liquid separator according to claim 10, wherein the refrigerant inlet delivers the incoming refrigerant in a flow direction that corresponds to a tangential direction of an upper inner wall so that the incoming refrigerant swirls in an upper gas-liquid separator portion to thereby provide centrifugal separation between the refrigeration oil and the liquid-phase refrigerant.